

11.9 WATER COLLECTION

11.9.1 Grab Samples (Streams)

A. EQUIPMENT

1. Sample bottles (plastic or glass appropriate for the constituent being sampled and sized for the amount required for analysis)
2. Preservatives

B. COLLECTION

1. Select a spot where the sample shall represent the stream or river. In small, wadable streams, a sample collected mid-depth at midstream is usually assumed to represent the source. If flow patterns, depth, or another feature suggests that such a location would probably not produce a representative sample, select a better place to sample.
2. Sample bottles shall be identified with the following information (using a sample label or indelible pen) : station name and number, date, parameters (metals, nutrients, TSS/VSS, commons), and preservatives.
3. Stand in the stream facing upstream. Rinse out the bottles three times with the source water. Fill bottles, leaving enough room for the preservative. When collecting TSS, fill the bottle no more than 75% full which allows the laboratory analyst to thoroughly mix the sample before aliquoting.
4. Preserve samples following recommended EPA guidelines (refer to Section 10.5).

C. FILTRATION

Filtration is required only for the collection of dissolved constituents. Refer to the specific procedure of interest for sample filtration.

D. PRESERVATION

Samples must be preserved following recommended EPA guidelines (refer to EPA Handbook Section 3.1.4).

E. PRECAUTIONS

1. Be sure that the inside surfaces of sample bottles and bottle caps are not touched or come into contact with some object or material that could contaminate the sample.
2. Check sample bottles to make sure that bottles are correctly identified with the required information. Make sure samples are promptly and correctly preserved.
3. Tighten the bottle caps securely to avoid loss of contents.

F. QUALITY CONTROL

The most important aspects of quality control in the collection of water quality samples are:

1. Samples collected represent the source at the time the samples are collected, and that these samples shall produce the quality of information necessary to meet the objectives of the survey.
2. The integrity of the samples collected is not compromised by contamination, misidentification, or improper sample handling or preservation.

G. SPECIAL INSTRUCTIONS

Several water quality constituents require a slight modification in the collection procedure. For example, sample bottles for oil and grease, and volatile organic compounds shall not be rinsed with the source water before filling. This method is acceptable for most commonly analyzed constituents (BOD, COD, TSS, commons, metals, nutrients). Consult a reference or a laboratory analyst about sample containers, preservatives, collection procedures, etc., when samples are collected for less routine analysis.

H. REFERENCES

U.S. EPA (U.S. Environmental Protection Agency). 1982 Handbook for Sampling and Sample Preservation of Water and Wastewater, U.S. EPA-600/4-87-049, Environmental Monitoring and Support Laboratory, Office of Research and Development, Cincinnati.

11.9.2 Dissolved Nutrients or Metals

A. EQUIPMENT

1. One 500ml. wide-mouth polyethylene collection bottle (Nalgene or equivalent)
2. One Swin-Lok nuclepore filter holder (with 47mm diameter, 0.45um Gelman Supor-450 membrane filter and 47mm diameter Whatman GF/C glass fibre prefilter)
3. One 60ml syringe (Charise)
4. One 150ml polyethylene sample bottle
5. One 100ml polyethylene sample bottle

B. COLLECTION

Rinse the 500ml bottle three times with the ambient water sample. Fill the bottle to within several millimeters of the top, then cap. If the sample contains significant suspended solids that might making filtering difficult, allow the sample to settle no longer than 1 hour.

C. FILTRATION

1. Draw 50ml of sample into the syringe. Insert syringe into filter holder cap and purge the filter with water. Waste the filtrate.
2. Detach syringe and draw another 50ml of sample. Filter approximately 25ml into each sample bottle. Rinse bottles with filtrate and discard rinse water.
3. If collecting for Soluble Reactive Phosphorus (SRP), filter 50ml of water into the 100ml bottle. Label the bottle for SRP analysis (Do not preserve).
4. If collecting for dissolved nutrients, filter 100ml of water into the 150ml bottle. Immediately preserve with H_2SO_4 . Label for analysis of N (dissolved NH_3 and dissolved $NO_2 + NO_3$) or P (dissolved ortho-phosphorus; Note: this is not the same as soluble reactive phosphorus).

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D. PRESERVATION

For dissolved nutrients, dilute H_2SO_4 for N (provided by laboratory in marked ampules) to compensate for a smaller sample size than is used for total nutrients (100 ml verses 250 ml). Do not use any preservative for SRP. Chill to $<4^\circ C$. SRP must be analyzed within 48 hours; sample to be analyzed for N must meet the recommended holding times.

For metals, use dilute HNO_3 to compensate for a small sample size.

E. PRECAUTIONS

1. Special care must be taken to avoid sample contamination. Do not touch the surfaces of any filtration apparatus (syringes, filter holder inlet or outlet, caps of collection or sample bottles) which shall come into contact with the filtered or unfiltered sample. Do not let these surfaces come into contact with the surfaces of other objects to prevent contamination from or transfer of dirt, dust, oil, grease, etc.
2. Keep filtered samples well chilled ($<4^\circ C$). Special arrangements for sample shipment, analysis, etc., may have to be made to meet the 48-hour holding time for SRP.
3. Use 150ml bottles for nutrients and metals, and 100 ml bottles for SRP. This standardization shall help avoid confusion during sample preservation and laboratory analysis.

F. QUALITY CONTROL

See Field Collection Procedure, Section 10.4, for the preparation of filter blanks.

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G. SPECIAL INSTRUCTIONS

Use only apparatus prepared using Equipment Preparation
Procedure, Section 11.1.

H. REFERENCES None

I. PROJECT

Clark Fork Basin Study, NPDES Compliance Monitoring,
Intensive

11.9.3 Integrated Samples (Equal Width and Depth)

An integrated sampling design may be desirable to reflect the average concentration for parameters sampled in stratified lakes and reservoirs. The DEQ uses point integration sampling of lakes using a Kemmerer bottle or similar device, and compositing.

Integration sampling may also be desirable for constituents that are not uniformly dissolved or suspended in the water column of streams and rivers. The constituents sampled may include total suspended sediment, total recoverable metal, total metals, or total nutrient concentrations that may be associated with sediment. Stream integration sampling is an attempt to meet the basic requirement that the sample collected represents the entire water-sediment mixture at the immediate vicinity of the sampling point at the time of sampling.

The DEQ uses a DH-48 depth integrating sampler and the equal-width-increment method (USGS, 1985) to sample wadeable streams. The methods incorporate equal width and depth by sampling by depth integration at vertical space across a transect. A total load (i.e., tons/day or lbs/day) of sediment, total nutrients or total metals can be estimated by measuring stream discharge simultaneously with the collection of an integrated sample. The total load is calculated by the following equation:

Depth Integrated Sample Concentration (mg/L)(0.000000011026
tons/mg)(28.31684 L/CF)(Measured CFS)(86,400 sec/day) =
tons/day

A. PRECAUTIONS

If sampling for trace metals do not use metal alloy integrated samplers where the sample has contact with the metal.

B. REFERENCES

National Handbook of Recommended Methods For Water - Data Acquisition, USGS (1977)

Field Guidelines for Collection, Treatment, and Analysis of Water Samples, Montana District. U.S. Geological Survey Open-File Report 85-409 (1985)

11.9.4 Pesticides

A. EQUIPMENT

Acetone-rinsed one-gallon glass container with teflon-lined caps (supplied by Chemistry Laboratory)

B. COLLECTION

Samples collected from surface water for pesticide analyses are collected as are most other water samples.

The container does not need to be rinsed with the source water. Fill the container and cap.

C. FILTRATION

None

D. PRESERVATION

No preservative is added. Chill the sample to $<4^{\circ}\text{C}$. Holding time is 14 days.

E. PRECAUTIONS

None

F. QUALITY CONTROL

None

G. SPECIAL INSTRUCTIONS

Laboratory analyst needs some idea of the specific pesticide to be analyzed. No scan can be run to give preliminary identification of one or a group of pesticides that might be present. Consult with the Chemistry Laboratory before samples are collected.

H. REFERENCES

None

I. PROJECT

Intensive Surveys (Complaint Investigations)

11.9.5 Water Sampling Equipment (Teflon Bailer, Kemmerer, and Van Dorn Bottles)

The physical location of the investigator when collecting a sample may dictate the equipment to be used. If surface water samples are required, direct dipping of the sample container into the stream is desirable. This is possible, however, only from a small boat, a pier, etc., or by wading in the stream. Wading, however, may cause bottom deposits to rise and bias the sample. Wading is acceptable if the stream has a noticeable current (is not impounded), and the samples are collected directly into the bottle while pointed upstream. If the stream is too deep to wade or if the sample must be collected from more than one water depth or from a bridge, etc., supplemental sampling equipment must be used.

Teflon bailers may be used for surface water sampling, if the data requirements do not require a sample from a strictly discrete interval of the water column. A closed top bailer with a bottom check-valve is sufficient for many studies. As the bailer is lowered through the water column, water is continually displaced through the bailer until the desired depth is reached, at which point the bailer is retrieved. This technique may not be successful where strong currents are found, or where a discrete sample at a specific depth is required.

If discrete samples are desired at a specific depth, and the parameters to be measured do not require a Teflon coated samplers, a standard Kemmerer or Van Dorn sampler may be used. The Kemmerer sampler is a brass cylinder with rubber stoppers that leave the ends of the sampler open while being lowered in a vertical position to allow free passage of water through the cylinder. The Van Dorn sampler is plastic and is lowered in a horizontal position. In each case, a messenger is sent down a rope when the sampler is at the designated depth, to cause the stoppers to close the cylinder, which is then raised. Water is removed through a valve to fill respective sample bottles. With a rubber tube attached to the valve, DO sample bottles can be properly filled by allowing an overflow. With multiple depth samples, care shall be taken not to stir up the bottom sediment and thus bias the sample.

A plastic bucket can be used to collect samples if the parameters to be analyzed do not preclude it. However, the bucket shall be rinsed twice with the sample water before collection of the sample.

11.9.6 Automatic ISCO Samplers

The automatic ISCO sampler is a programmable sampler that can be used where intensive routine sampling is desired. The sampler can be set to sample at time intervals or flow intervals by hook up to an automated ISCO flow meter. The sampler can be programmed to collect composite or grab samples at preset volumes.

The ISCO sampler, however, can require a great deal of effort to install and needs to be protected from the elements and vandalism. In order to generate useful data the ISCO sampler also requires sound technical support.

A. REFERENCES Owners Manual